

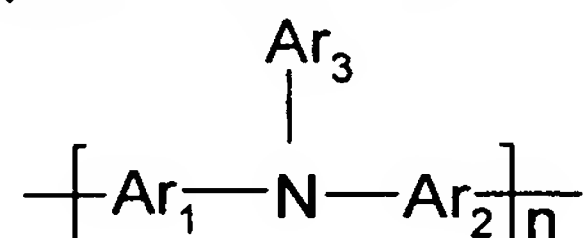
Claims

1. A composition for use as an organic semiconducting (OSC) material, the composition comprising:
  - (i) at least one higher molecular weight organic semiconducting compound having a number average molecular weight ( $M_n$ ) of at least 5000, and
  - (ii) at least one lower molecular weight organic semiconducting compound having a number average molecular weight ( $M_n$ ) of 1000 or less.
2. A composition as claimed in Claim 1 wherein the  $M_n$  of the higher molecular weight semiconducting compound is at least 7000.
3. A composition as claimed in Claim 2 wherein the  $M_n$  of the lower molecular weight semiconducting compound is at least 150.
4. A composition as claimed in any one preceding Claim wherein at least one of the higher and lower molecular weight semiconducting compounds has a charge carrier mobility,  $\mu$ , of at least  $10^{-5}\text{cm}^2/\text{V.s.}$
5. A composition as claimed in Claim 4 wherein said charge carrier mobility,  $\mu$ , is at least  $10^{-4}\text{cm}^2/\text{V.s.}$
6. A composition as claimed in Claim 4 or 5 wherein at least the higher molecular weight semiconducting compound has said charge carrier mobility.
7. A composition as claimed in Claim 4 or 5 wherein both the higher and lower molecular weight semiconducting compounds have said charge carrier mobility.
8. A composition as claimed in any one preceding Claim wherein the higher and lower molecular weight semiconducting compounds are present in the composition in the relative proportions 10:90 – 90:10 parts by weight.
9. A composition as claimed in Claim 8 wherein the higher and lower molecular weight semiconducting compounds are present in the composition in the relative proportions 30:70 – 70:30 parts by weight.
10. A composition as claimed in Claim 9 wherein the higher and lower molecular weight semiconducting compounds are present in the composition in the relative proportions 40:60 – 60:40 parts by weight.

11. A composition as claimed in any one preceding Claim wherein the lower molecular weight semiconducting compound comprises either an oligomer having a number of repeat units,  $n$ , in the range 2 – 5, or a non-oligomeric molecule where  $n=1$ .

12. A composition as claimed in Claim 11 wherein the lower molecular weight semiconducting compound contains one or more of arylamine, fluorene, and/or thiophene groups.

13. A composition as claimed in Claim 12 wherein the lower molecular weight semiconducting compound has a Formula 1:



Formula 1

wherein  $\text{Ar}^1$ ,  $\text{Ar}^2$  and  $\text{Ar}^3$ , which may be the same or different, each represent, independently if in different repeat units, an aromatic group (mononuclear or polynuclear) optionally substituted by at least one optionally substituted  $\text{C}_{1-40}$  hydrocarbyl group and/or at least one other optional substituent and  $n = 1$  to 4.

14. A composition as claimed in any one preceding Claim wherein the higher molecular weight semiconducting compound comprises a conjugated polymer.

15. A composition as claimed in Claim 14 wherein the higher molecular weight semiconducting compound comprises a polymer being either a homo-polymer or copolymer, including a block-copolymer, containing one or more of arylamine, fluorene, thiophene and/or optionally substituted aryl groups.

16. A composition as claimed in Claim 15 wherein the polymer is a homo-polymer or copolymer, including a block-copolymer, containing arylamine and/or fluorene units.

17. A composition as claimed in Claim 15 wherein the polymer is a homo-polymer or copolymer, including block-copolymer, containing fluorene and/or thiophene units.

18. A composition as claimed in Claim 15 wherein the polymer is an arylamine group containing polymer having a Formula 11 wherein Formula 11 is the same as Formula 1 except that n is at least 5.
- 5 19. A composition as claimed in Claim 18 wherein n is at least 20.
20. A composition as claimed in any one preceding Claim wherein the higher and lower molecular weight semiconducting compounds each contain one or more of the following groups in common: arylamine, fluorene and/or thiophene.
- 10 21. A composition as claimed in Claim 20 comprising at least one compound of Formula 1 where  $n = 1$  or  $2$  as the lower molecular weight compound and at least one compound of Formula 11 where n is at least 20 as the higher molecular weight compound.
- 15 22. A composition as claimed in any one preceding Claim further comprising a binder resin.
- 20 23. Use of the composition as claimed in any one preceding claim in an electronic device.
24. A layer for use in an electronic device, the layer comprising a composition according to any one preceding Claim.
- 25 25. A layer as claimed in Claim 24 wherein the layer is deposited on a part of an electronic device by solution coating.
- 30 26. A layer as claimed in Claim 24 wherein the layer is deposited on a part of an electronic device by one of the following coating or printing techniques : dip coating, roller coating, reverse roll coating, bar coating, spin coating, gravure coating, lithographic coating (including photolithographic processes), ink jet coating (including continuous and drop-on-demand, and fired by piezo or thermal processes), screen coating, spray coating and web coating.
- 35 27. A layer as claimed in any one of Claims 24 to 26 wherein the layer is deposited by first depositing one of the higher and lower molecular weight compounds followed by depositing the other of the higher and lower molecular weight compounds and allowing the higher and lower molecular weight compounds to diffuse into each other to form the composition.
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28. A layer as claimed in any one of Claims 23 to 27 wherein the layer is used as a semiconducting layer in one of the following electronic devices: field effect transistor (FET), organic light emitting diode (OLED), photodetector, chemical detector, photovoltaic cell, capacitor or memory.

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29. A layer as claimed in any one of Claims 23 to 28 wherein the layer is used as a semiconducting layer in a field effect transistor (FET).

30. Use of the composition as claimed in any one of Claims 1 to 22 in an electrophotographic apparatus.

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